

## **Attachment I**

### Causal Analysis Report

### Chevron Richmond Refinery Reportable Flaring Events

November 2-3, 2020

Flaring Due to Power Loss at #2 and #4 Substations

## Refinery Flare Event – Cause Investigation Report

**1. Date on which the report was drafted:** January 27, 2021

**2. The refinery name and site number:**

Refinery: Chevron Richmond Refinery

Refinery Site Number: A0010

**3. The assigned refinery contact name and phone number:**

Contact Name: Brandon Sutter

Contact Phone Number: (925) 394-8773

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Is this a rescission/modification of a previous report: No.

Date of initial report: N/A

Reason for rescission/modification: N/A

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**4. Identification of flare (s) at which the reportable event occurred by reviewing water seal monitoring data to determine which seals were breached during the event**

Flare	Reportable Event (SO <sub>2</sub> or Vent Gas Volume)
NISO (S-6013)	SO <sub>2</sub> , Vent Gas Volume
RLOP (S-6039)	SO <sub>2</sub> , Vent Gas Volume
SISO (S-6012)	SO <sub>2</sub> , Vent Gas Volume
H2 (S-6021)	Vent Gas Volume

**5. The flaring event duration for each affected flare**

**Flare (Source Number): NISO (S-6013)**

The Date(s) of the event: November 2-3, 2020

The start time of the event: 12:57 PM

The end time of the event: 04:37 AM

The net duration of event (in hours and minutes): 15 hours, 40 minutes

**Flare (Source Number): RLOP (S-6039)**

The Date(s) of the event: November 2-3, 2020

The start time of the event: 12:58 PM

The end time of the event: 05:35 AM

The net duration of event (in hours and minutes): 16 hours, 37 minutes

**Flare (Source Number): SISO (S-6012)**

The Date(s) of the event: November 2-3, 2020

The start time of the event: 12:59 PM

The end time of the event: 02:42 AM

The net duration of event (in hours and minutes): 13 hours, 43 minutes

**Flare (Source Number): H2 (S-6021)**

The Date(s) of the event: November 2-3, 2020

The start time of the event: 12:57 PM

The end time of the event: 05:49 AM

The net duration of event (in hours and minutes): 16 hours, 52 minutes

*\*note all flaring was intermittent during the times described above in Section 5*

**6. A brief description of the flaring event –**

On November 2nd, 2020, during testing of the tone-based communication system between the SOSS (Standard Oil Switching System) and two electrical substations (#2 and #4), a trip of the substation breakers caused a loss of power to the Hydroprocessing ABU (Area Business Unit). This was due to an incorrectly labeled drawing that did not match the circuitry in the field. Loss of power to units in the Hydroprocessing Area Business Unit led to process gases being sent to the relief system. Flaring began at approximately 12:57 PM at the North Isomax (NISO) flare. The primary source of vent gas flared during this event was process material from the multiple units in the Hydroprocessing Area Business Unit. Operations immediately responded, resetting and reenergizing the system to allow the area operators to begin restoring the units. Flaring stopped on November 3rd, 2020 at approximately 5:35 AM. The sulfur dioxide (SO<sub>2</sub>) emissions from the RLOP, NISO, and SISO flares exceeded 500 pounds (lbs) within a 24-hr period, and the vent gas volume from the NISO, RLOP, SISO, and H2 flares exceeded 500,000 SCF within a 24-hr period.

**7. A process flow diagram showing the equipment and process units that were the primary cause of the event.**

See Attachment Ia.

**8. The total volume of vent gas flared (MMSCF) throughout the event**

Flare	Volume (MMSCF)
NISO	1.69
RLOP	3.60
SISO	4.75
H2	3.89

**9. The emissions associated with the flaring event per calendar day**

Flare	Calendar Day	CH <sub>4</sub> (lbs.)	NMHC (lbs.)	SO <sub>2</sub> (lbs.)
NISO	November 2, 2020	1,357.7	4,178.1	54,629.2
NISO	November 3, 2020	72.1	222.0	2,902.9
RLOP	November 2, 2020	719.2	2,220.1	16,304.3
RLOP	November 3, 2020	64.3	101.2	134.4
SISO	November 2, 2020	402.0	1,518.8	10,098.5
SISO	November 3, 2020	48.9	184.8	1,228.7
H2	November 2, 2020	1694.1	218.5	0.89
H2	November 3, 2020	255.2	31.4	0.17

*Assumptions used to calculate some of the emissions – consistent with the reporting under Reg. 12-11.*

**10. A statement as to whether or not the gas was scrubbed to eliminate or reduce any entrained compounds and a list of the compounds for which the scrubbing was performed.**

The vent gas was not scrubbed to eliminate or reduce any entrained compounds.

**11. The primary cause of the flaring event including a detailed description of the cause and all contributing factors. Also identify the upstream process units that contributed vent Gas flow to the flare header and provide other flow instrumentation data where available.**

Root cause: Activation of relay.

Contributing factor: Elementary diagram drawings utilized did not correctly reflect wiring in the field.

Contributing factor: The activated relays are auxiliary relays. Labels were incorrect/not clear.

The main contributor of vent gas flow during this event originated from multiple units in the Hydroprocessing ABU.

**12. Describe all immediate corrective actions to stabilize the flaring event, and to reduce or eliminate emissions (flare gas recovered or stored to minimize flaring during the event). If a decision was made not to store or recover flare gas, explain why.**

Operations immediately responded, resetting and reenergizing the system to allow the area operators to begin restoring the units.

**13. Was the flaring the results of an emergency? If so, was the flaring necessary to prevent an accident, hazard or release to the atmosphere?**

The flaring was the result of an emergency, as defined in Regulation 12-12 (a condition at a petroleum refinery beyond the reasonable control of the owner or operator requiring immediate corrective action to restore normal and safe operation that was caused by a sudden, infrequent and not reasonably preventable equipment failure). The flaring was necessary to prevent an unabated release to the atmosphere.

**14. If not the result of an emergency and necessary to prevent an accident, hazard or release to the atmosphere, was the flaring consistent with an approved FMP? If yes, provide a citation to the facility's FMP and any explanation necessary to understand the basis for this determination.**

The flaring was the result of an emergency. The flaring is also consistent with Chevron's FMP Section 5.4 Figure 5-1. This event was unplanned. Causes for the flaring were analyzed through a TapRoot investigation. The corrective actions have already been or will be implemented to reduce the likelihood of a recurrence of flaring resulting from the same causes.

**15. If the flaring was due to a regulatory mandate to vent to flare, why couldn't the gas be recovered, treated, and used as fuel gas?**

N/A. Flaring was not due to regulatory mandate.

**16. Identify and describe in detail each prevention measure (PM) considered to minimize flaring from the type of reportable flaring event that occurred.**

**a) State whether the PM is feasible (and will be implemented), or not feasible**

**b) Explain why the PM is not feasible, if applicable**

All prevention measures have been considered and have or will be implemented.

1. Submit updated elementary drawings to drafting.

Completion date: 12/15/2021

2. Add labeling to relays located in 2 and 4 Substation high side buildings.

Completion date: 7/30/2021

3. Update protective relay & metering diagrams for 2 and 4 Substation.

Completion date: 12/15/2021

4. Meet with procedure owner to discuss whether Protection Relay Diagrams should be Process Safety Instrumentation (PSI) documents.

Completion date: 7/30/2021

5. Develop a procedure for testing the tone-based communication system and include when a written work plan is required.

Completion date: 12/30/2021

6. Determine whether implementing field verification of the Foreign Prints and Protective Relay Diagrams for the SOSS (Standard Oil Switching System) would reduce the likelihood of a recurrence.

Completion date: 12/15/2022

# Power Outage

